2.2.3 ENZYMES

What are Enzymes?

Enzymes are organic biological catalysts made of protein they speed up a reaction without being used up themselves in the reaction.

Enzyme Action

The substance that an enzyme acts on is its **substrate**

The substance(s) that the enzyme forms is called the **product(s)**

The part of the enzyme that joins with the substrate is known as the **active site**

Denatured enzymes

Enzymes whose active site has been changed permanently

Inhibitors
Attach to enzymes and destroy their shape
Harmful inhibitors: Nerve Gas, cyanide
Beneficial inhibitors: Insecticides and some drugs.

The induced fit model of enzyme action

What happens when an enzyme meets a substrate?

- The enzyme joins with the substrate
- The active site of the substrate changes shape slightly
- The enzyme and substrate form an **enzyme-substrate complex**

Enzyme Facts

- Human enzymes work best at body temperature (37 °C)
- Plant enzymes work best at 20-25 °C
- Above certain temperatures enzymes start to lose their shape and the rate of reaction falls
- When the shape is fully lost the enzyme is said to be **denatured** this is usually a permanent condition

Factors that affect rate of enzyme action

1. Temperature
2. pH
3. Substrate concentration
4. Enzyme concentration

Bio - processing

Bio-processing is the use of enzyme controlled reactions to produce a useful product

Bio-processing can be used to produce a vast range of products such as cheeses, beer, antibiotics, vaccines, vitamins and perfumes.

Immobilised or fixed enzymes

This means they are attached to each other or an inert substance.

Advantages

- Can be reused - this cuts costs
- Efficiency of enzyme is not affected
- Immobilised enzymes can be easily recovered from the product so you can get a pure sample of product easily
- Enzymes frequently become more stable when immobilised

Uses of immobilised enzymes

- Food sweeteners
- Make antibiotics